
RISE
Lund University
AQ Elautomatik
Big Science Sweden
BIG SCIENCE BREAKFAST
Great to see you

Today's program

- Welcome and introduction, Frida Tibblin Citron
- Overview of ITER and technical deliverables, Max Collins
- Experience in making projects with ITER, Håkan Nilsson
- Manufacturing power electronics, Patrik Olsson, AQ Elautomatik
- Conclusions
- Upcoming activities from Big Science Sweden


big science sweden
Business,
Knowledge Transfer
and Careers
… is good business for Sweden
BIG SCIENCE

We are the link to the Big Science facilities

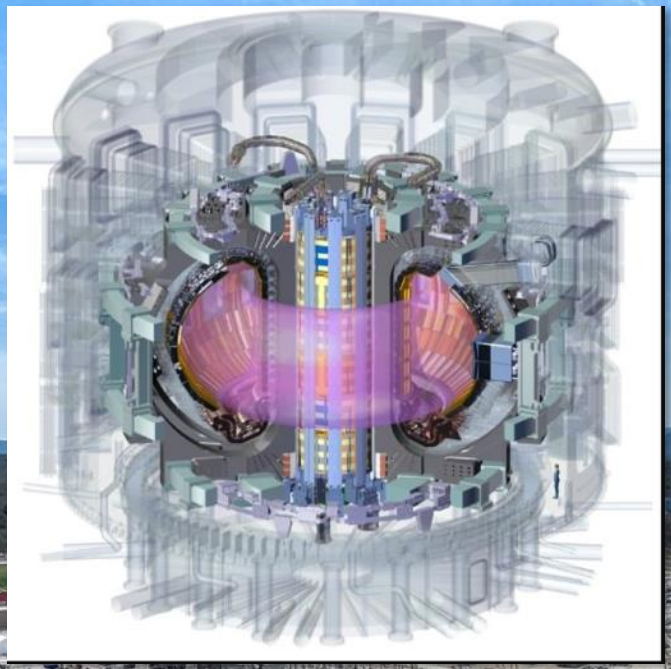
MAX IV • ESS • CERN • XFEL • DESY • EISCAT • ILL • FAIR • ITER • DESY • ESRF • ESO • SKA

Overview of ITER and technical deliverables

Max Collins, PhD
Industrial Liaison Officer for F4E/ITER,
Big Science Sweden

FUSION ENERGY

Fusion, the nuclear reaction that powers the Sun and the stars, is a promising long-term option for sustainable global energy supply. Harnessing fusion's power is the goal of ITER, which has been designed as the key experimental step between today's fusion research machines and tomorrow's fusion power plants.



ITER:

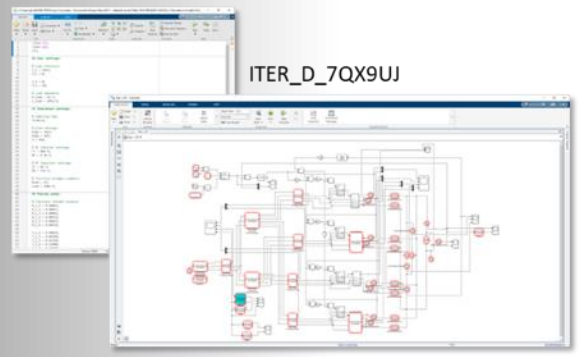
- Reaction: deuterium + tritium
  - Deuterium exists in seawater
  - Tritium can be “bred” as part of the process
- Fusion is done in burning plasma @ 150 million degrees Celsius = challenges …
- Plasma is initiated, confined, shaped and controlled with large superconducting magnets

Contract #1

ELM Power Supplies Architecture Studies

- Expert views, justification, and evidence for the suitability of different architectures for ELM power supplies
- Recommendations for final solutions (KPI, cost, weight, size)
- SMF impact on magnetically sensitive components

ITER_D_7QPZHV



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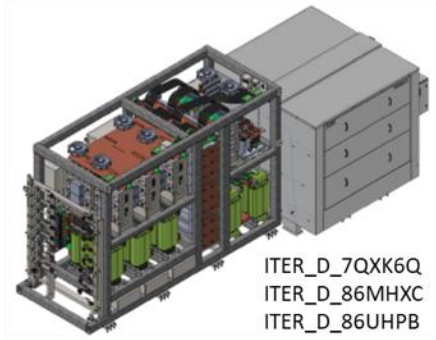


ITER_D_7QXK6Q
ITER_D_86MHXC
ITER_D_86UHPB

D2.1 Detailed study report

Format: Word (.docx)

For each architecture: design overview and description, performance, losses and temperature, lifetime, reliability, protection and safety, overview table.

Annexes: common topics, shielding of magnetic fields, selection of sensor technology, and list of signals

D2.2 Bill of Materials

Format: Excel (.xlxs)

Table including components, costs, suppliers, and external links to datasheets.

ITER_D_7QSV6W

D2.3 Simulation models

Format: Matlab script and Simulink (.m, .slx)

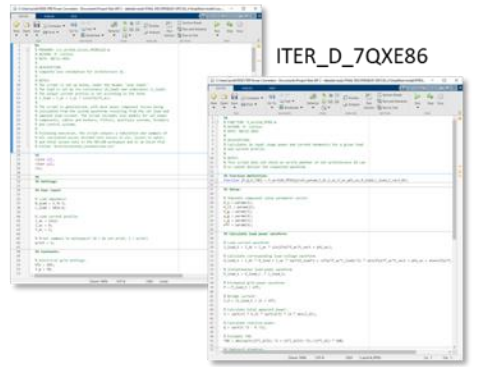
Includes thermal modeling and control loops.

Used for determining architecture performance.

D2.4 Simplified models

Format: Matlab (.m)

Scripts for fast calculation of AC power quality parameters, power losses (air and water) and device temperature for any load current waveform.



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D2.5 Mechanical 3D models

Format: STEP file (.STEP, .stp)

3D visualization of power supply (separate files for transformer and converter cabinets)

D2.6 Electrical schematics

Format: pdf, vsd

Exported schematics from EPLAN and Visio.

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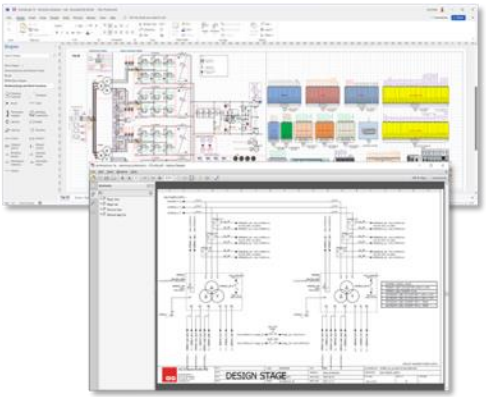
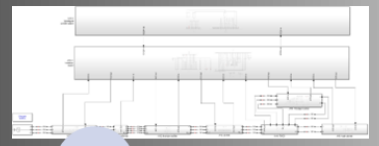


Completed in Q1/2023

Contract #2

Design and procurement of a power electronics assembly for SMF compatibility tests

- Design, manufacture, and deliver system to ITER for performing SMF compatibility tests on power electronics devices
- Small-scale system representative of typical power electronics systems to be installed at ITER
- 7 interconnected subsystems tested individually in magnetic field generator at ITER



D1.2 Simulation models

Format: Matlab Simulink(.slx)

Control of system, integrated into real-time target simulator (Speedgoat)

D1.4 Bill of Materials

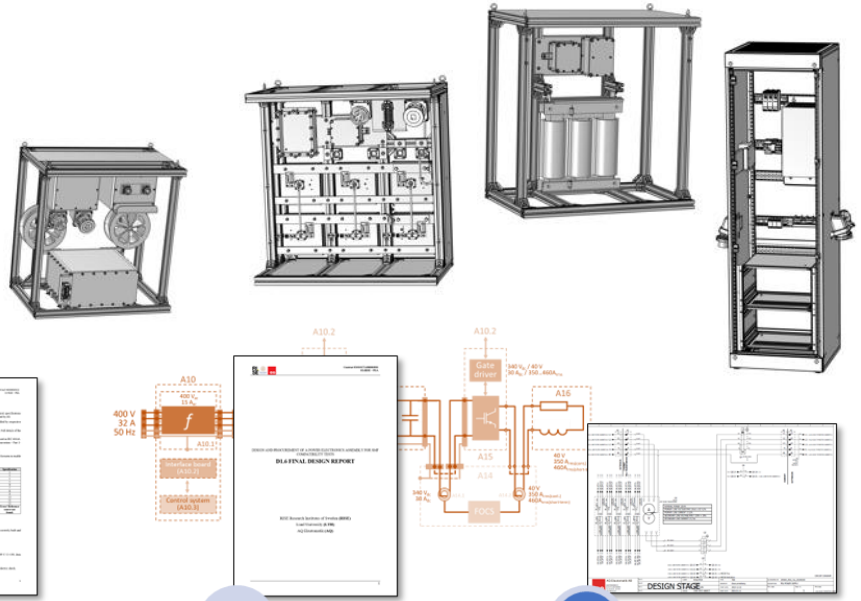
Format: Excel (.xlxs)

Table including components and suppliers

D1.5 Testing and commissioning plan

Format: report (.docx)

Requirements and acceptance criteria of FAT



D1.6 Final design report

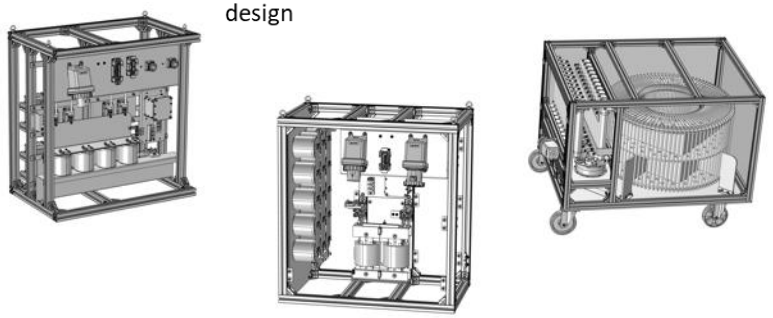
Format: report (.docx)

Description and justification of complete system design

D1.7 Manufacturing dossier

Format: ePlan

Electrical schematics and mechanical drawings



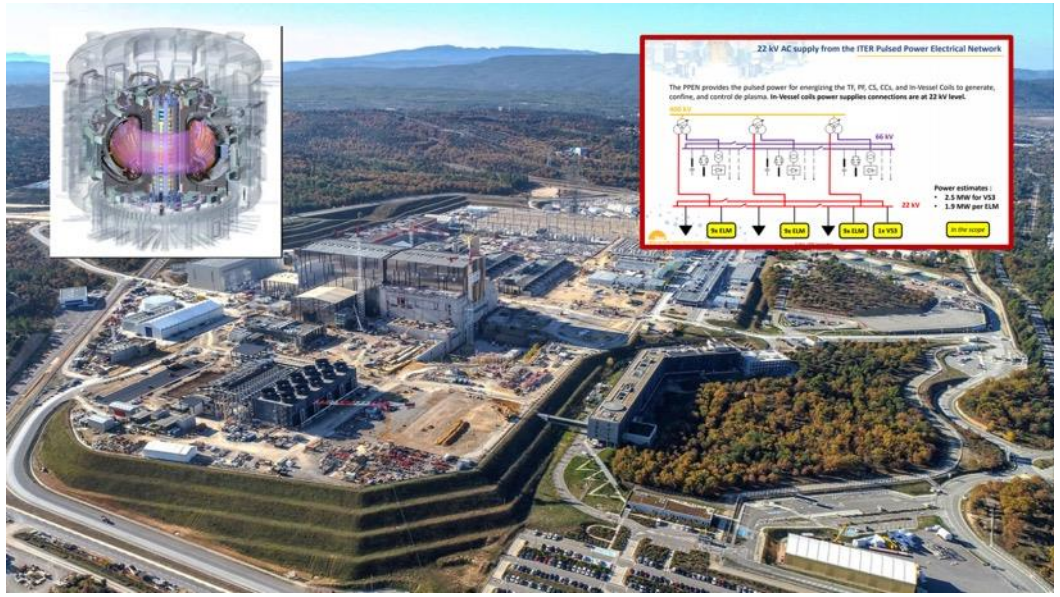
Delivered in Q4/2024

Experience in making projects with ITER

Håkan Nilsson

Business Developer, Big Science Sweden, RISE

ITER has a need for different electrical power converters to feed numerous super conducting coils



- **Presentation at ITER Big Science Business Forum 2021 on planned procurements within power electronics/converters**
- **Universities not accepted (preferably manufacturers)**
- **Restricted procurement**
- **Swedish consortium with RISE (as leader), Lund University (LTH) and AQ Elautomatik**
- **After formal discussions with the ITER Director of Procurements and support from BiSS and the ILO for ITER the Swedish consortium was accepted**

- **Extensive administrative tender documentation and requirements**
- **Draft consortium agreement and draft quality plan**
- **Evaluation based on 60% technical issues and 40% economy**

The price is evaluated as the lowest price offered will receive the maximum score of 40 and the other tenders will receive scores in accordance with the formula below:

Relative score = (lowest tender price received / tender price under evaluation) x 40

Technical criteria used for the award of the contract

	Criteria	Max. Points	Reference in the technical specification	Documentation to be submitted
1	Strategy for performing the studies based on the technical requirements and for identify the main performance of each architecture.	10	Sections 6, 7 and 8	Description of the strategy and methods used to perform the studies List of the tools, software and know how
2	Strategy for selecting the components (semiconductors & passive components) and the related assumptions (losses, Safe Operating Area, failure rates…)	10	Section 7	Description of the proposed strategy to select the components and the related assumptions (contact with suppliers, consideration of in-house qualified components…)
3	Proposed strategy to address the lifetime, reliability and robustness studies of the solutions, based on the mission profiles	10	Sections 7 & 8.5.6	Description of the strategy used to address this item List of method and tools
4	Strategy for estimating the cost, size and weight of each solution	15	Section 7	Description of the strategy used to address this item (Contact with suppliers, internal designs, return of experience…)
5	Resource and organization for performing these studies	15	Section 7 & 9	Presentation of the team, including the CV of the main members and experts and their roles. FORM 10 Description of the organization including the forecasted involvement (percentage) of the main team members and experts
	Maximum Total Points	**60**		

2021-12-17	Acknowledgement of Receipt
2022-01-21	Tender submission date (16.00 CET at the latest) Three envelopes: A – Administrative documents A – Technical documents B - Financial offer (password protected)
2022-03-03	Award letter
2022-03-18	Quality audit performed by ITER at RISE
2022-04-20	ITER Service Contract signed by ITER and RISE - Final consortium documents and quality plan
2022-04-22	Kick-off meeting ITER and RISE/LU/AQ - Bi-weekly follow up meetings

At present time one more contract has been awarded by ITER

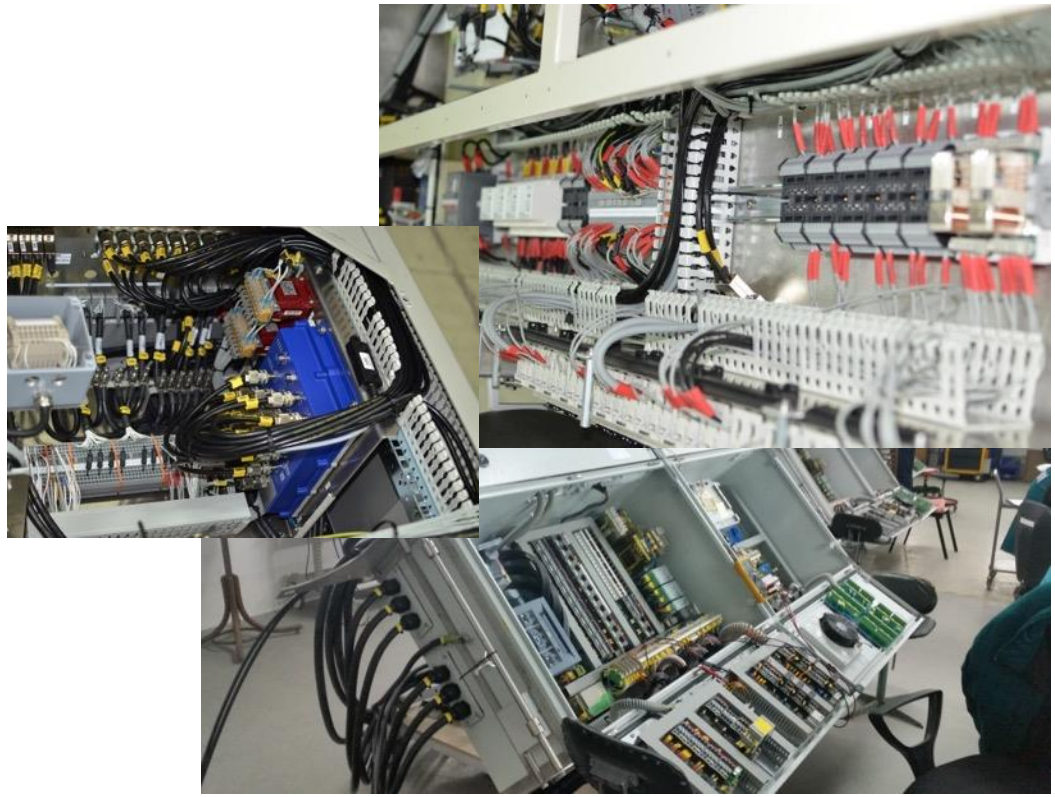
Manufacturing power electronics

Patrik Olsson
Marketing Coordinator,
AQ Elautomatik

Electric cabinet and construction

We offer electric cabinet manufacturing with components for customers

- Project management
- Electrical Engineering
- Assembly
- Purchasing & global sourcing of materials
- Installation of electrical cabinet
- Test & quality assurance
- Prototype manufacturing
- Series production
- LCC manufacturing
- VA / VE Analyzes



WE ARE RELIABLE

SVENSK KAPSLAD ELTEKNIK

CERTIFIERAT LEDNINGSSYSTEM DNV ISO 9001 · ISO 14001

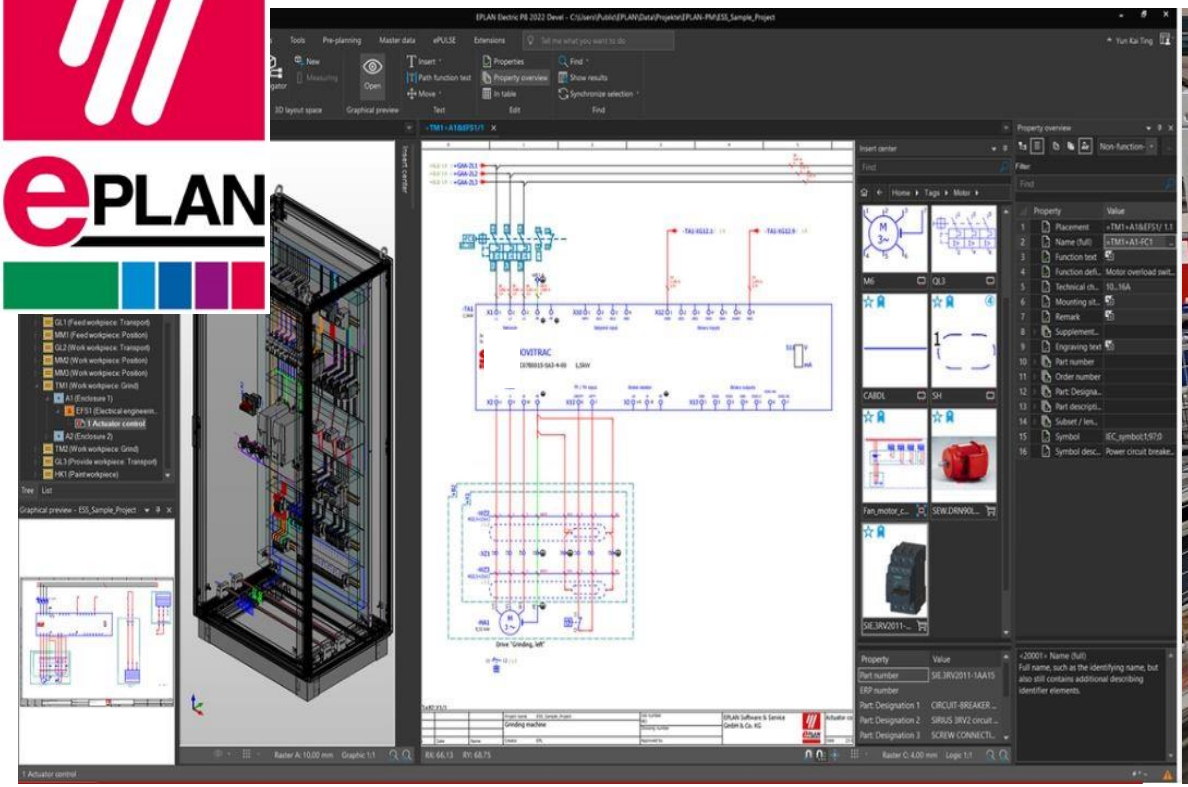
5 SYNA HÖGSTA KREDITKLASS 2025

LISTED

c UL US LISTED

EU

ITER Case -> Build To Print
- Construction, Electric cabinet, Sourcing, Assembly & Test



AQ Elautomatik Assembly site Lund (Gastelyckan)

From Visio Schematic Diagram to Electrical Drawings in Eplan
Finalizing quoted material to electrical BOM (Bill Of Material)

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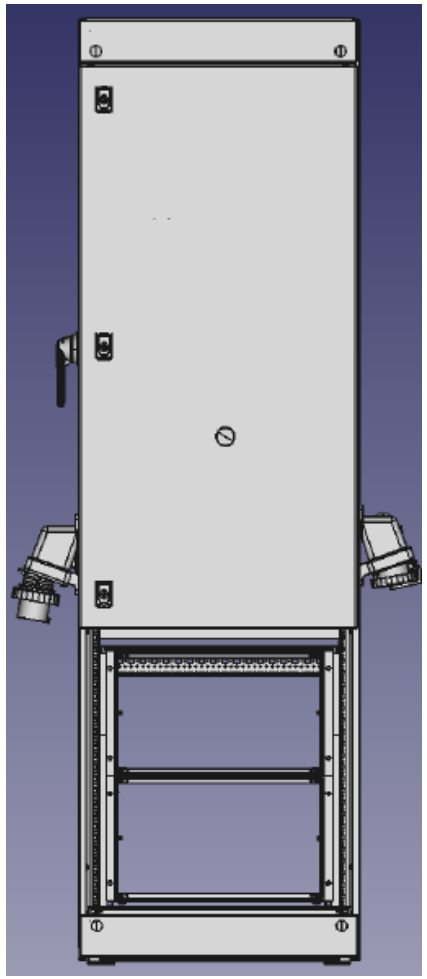
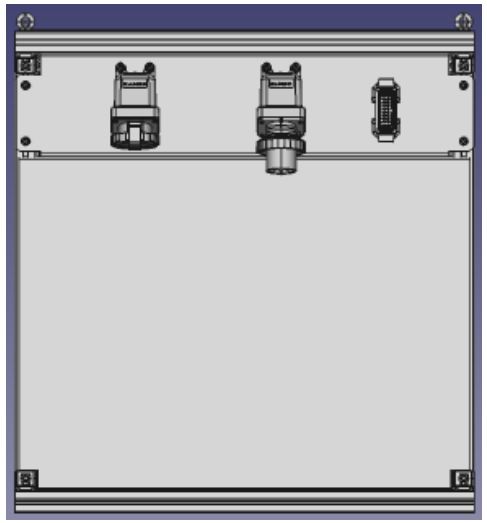
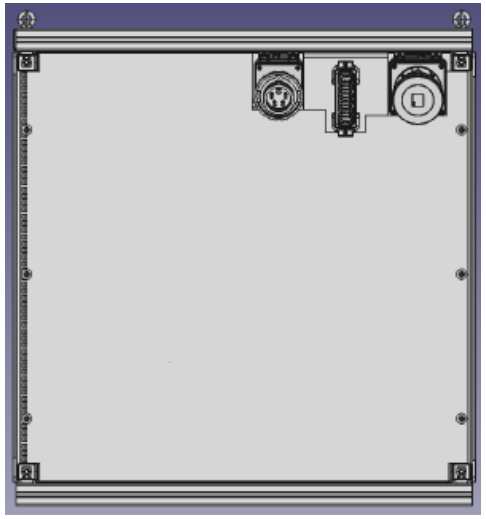
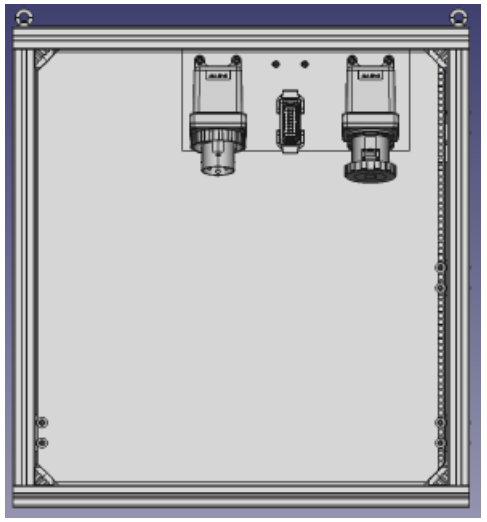
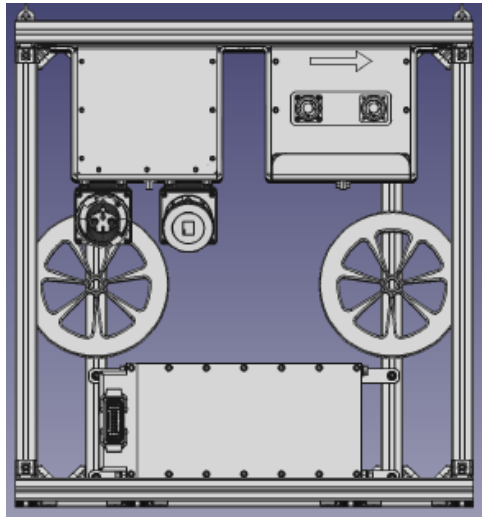
Mecanical drawings (.step)

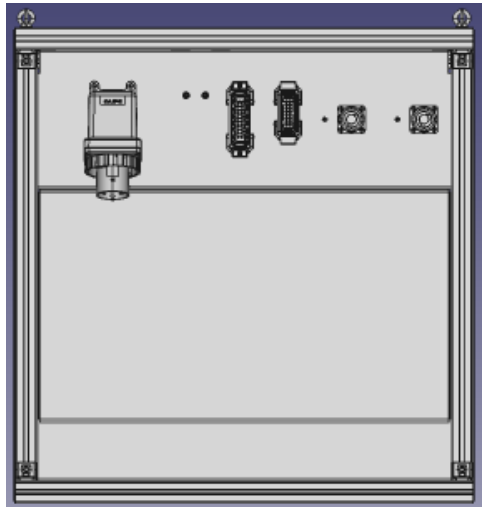


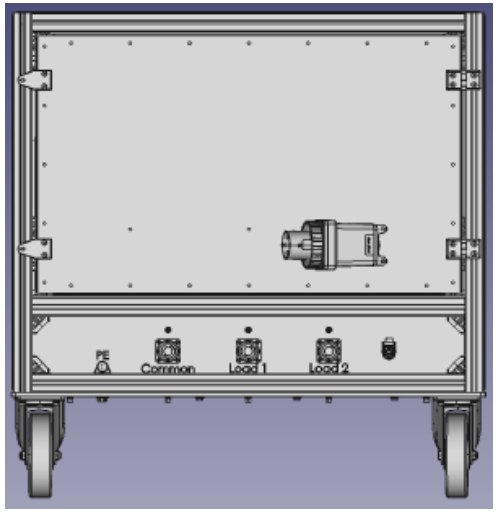




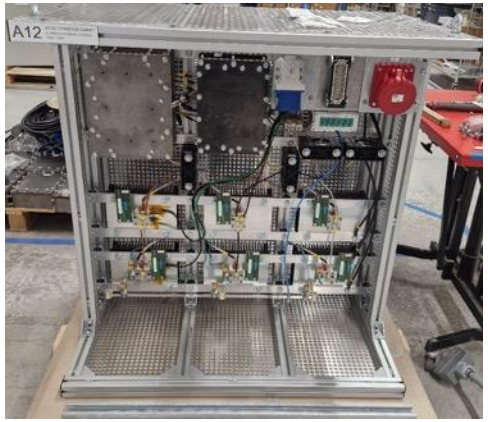


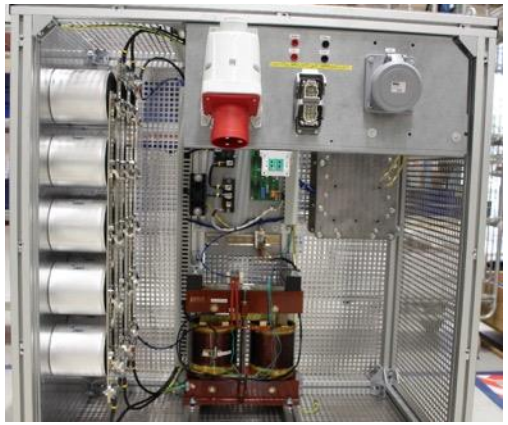


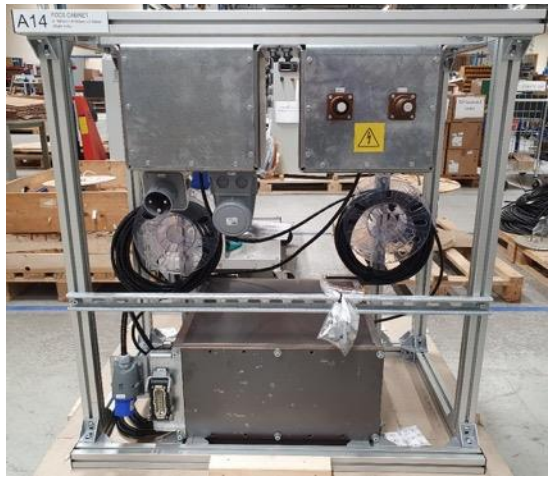




AQ Assembly ITER project (->Function test LTH)







Ready for shipment (dec 2024)

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Contact details

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Marketing Coordinator

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Webb. www.aqgroup.com

Don't fear the challenge, embrace it

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ITER site visit lead by the Swedish ambassador in France

- Sweden declares its interest in being active in Fusion research and in coming ITER projects and procurements

Conclusions

Doing business with ITER might look complicated, however:

- **do not hesitate to take contact with Big Science Sweden for advice or assistance**
- **the tender process is straight forward**
- **competence is a key factor in building confidence for future collaboration**

UPCOMING EVENTS IN AUGUST AND SEPTEMBER

We hope to see you there!